

length (Plate VI, fig. 5). The color is crimson, marked with purplish brown or blackish on the latticed ridges in the place of the usual spots, a more or less distinct square pale spot covering the depressed space (1) of joints 7-8. Length, 6.3-10 mm.

Cocoon as usual.

Food-plants.—Chestnut, oak, hickory, wild cherry.

EXPLANATION OF PLATE VI.

- Fig. 1. Stage I, side view enlarged, diagrammatic.
 " 2. One of the single setæ more enlarged.
 " 3. Larva in stage III enlarged.
 " 4. Granules from young larva.
 " 5. Mature larva, enlarged, full pattern.
 " 6. The same, widest spot.
 " 7. Front and side views.
 " 8. Mature larva, most reduced pattern.
 " 9. The same, a small red spot.
 " 10. Moth of *Heterogenea flexuosa*.
 " 11. The same, variety *caesia*.

NOTES ON SPECIES OF NOCTUA WITH DESCRIPTIONS OF NEW FORMS.

PLATE VII.

BY JOHN. B. SMITH, Sc.D.

In 1890 I published a revision of the species theretofore lumped under the generic term *Agrotis*, as Bulletin No. 44 of the U. S. National Museum, and divided up the species among fifteen genera, new and old. The general conclusions reached in that paper have approved themselves to me since that period; but the increased material has necessitated some changes in the standing of certain species.

The genus *Noctua* as restricted by me contained species with all the tibiæ spinose, the anterior not heavily armed; front smooth and feebly convex; antennæ in the male ciliate only; vestiture hairy, scaly or mixed; primaries with apices rectangular or rounded, and as a whole rather subparallel, if varying in width.

Nothing essential need be added to this description, and all the new forms since seen fit very nicely into the definition. Most of the addi-

tions have come from the northern portion of our country and emphasize the character of the genus as one of either high altitude or high latitude. It is quite probable that a few species yet remain to be discovered and these will in all likelihood be rather close allies to something already described.

The receipt of material from Manitoba and Calgary has, within the past few years, added considerable to our knowledge of the species of this genus and a very interesting example of close relationship is recorded here.

The additions above referred to have also enabled us to gain a better idea of the specific standing of some of our species and some of these facts are here recorded.

Noctua smithii *Snellen.*

Tijdschr. voor Entomologie, XXXIX, 157.

baja †Smith.

Bulletin 44, U. S. Nat. Mus. 78.

All authors who had written on the subject up to the date of Snellen's paper have assumed the identity of the European and North American examples labelled *baja*. Speyer, Zeller, Moeschler and Grote have all examined specimens from both countries and considered them as representatives of one species only. In the Revision above cited I pointed out that both Lederer and Speyer refer to the anterior tibiæ as unarmed, while in all the specimens seen by me they were spinose. Unfortunately I had no European examples for comparison, hence could only suggest the question: "whether we have not here as in the case of *triangulum* and *normaniana*, distinct species." Snellen has carefully compared specimens from both countries and finds the European form with constantly unarmed fore tibiæ. He therefore names the American form as above, while the structural difference thus brought out, assigns *baja* to my genus *Rhynchagrotis*. It is certainly remarkable that so well marked a structural difference should separate species superficially so much alike.

Snellen prefers to separate the European species on a somewhat different basis from that proposed by me, and does not accept my genera for their comparatively small number of forms. It must remain for the student with collections from all countries for comparison, to decide as to the advisability of subdivision and to select the basis for it.

It is also pointed out that *Carneades* Grt., is long since preoccupied by Bates, in Coleoptera. If the rule is to be strictly enforced, Mr. Grote's term must give way, probably to *Chera* Hubner.

Noctua hospitalis Grote.

Of this species I knew only the female type from the Hill collection in 1890. Mr. Grote was inclined in 1886 to consider this a form of *perconflua*, but as I pointed out, it is much nearer to the European *brunnea*. Two years ago Dr. Ottolengui took a perfect male at Manchester, N. H., which he kindly gave me, and recently I saw a specimen in the Strecker collection, labelled simply "N. Y."

The latter specimen was named *brunnea* and, compared with European examples in the same collection, no superficial differences were apparent. In view of what has appeared in other instances—notably that of *baja*—it would be unsafe to cite the two as identical; hence I present a picture of the male genitalia (Plate VII, fig. 9) for comparison with those of the European *brunnea* by any one with specimens of the latter at hand.

Noctua rubifera Grt.

There has been much confusion in collections between *rubifera* and *perconflua*, and even labels in Mr. Grote's handwriting are not always correctly applied. When the western forms were added, leading to *rosaria*, the confusion became yet greater and there seemed to be almost no line of division. *Esurialis* Grote, described from Washington I referred from a comparison of types in 1891 as a probable geographical race of *perconflua*.

Within the last five years I have received material in this group from all the Pacific Coast States, from Vancouver, from British Columbia, from Manitoba and from Calgary, and the result of a renewed study has been the conclusion that there are more species than has been realized, and that even in the East two species have been confused under the name *rubifera*. Fortunately Mr. Grote gives us a figure of his species (Can. Ent., VII, pl. I, f. 14), and of this type I have four examples from Orono, Me., Sharon Springs and the Adirondack Mountains, New York.

The sexual characters of the two males agree, and are not those figured by me on pl. IV, f. 37, Bull. 44 U. S. Nat. Museum. They are represented on the accompanying Plate VII, fig. 2. This species has the primaries rather narrow, especially in the male, the apex almost rectangular, outer margin evenly curved and the inner margin nearly straight. None of the ornamentation is at all contrasting, yet in most specimens a diffuse darker median shade is traceable.

Noctua cynica, sp. nov.

This species reminds one of *Orthodes cynica* in wing form and general appearance, hence I give it the same name. As compared with *rubifera*, with which it has been confused, it is much broader winged, with both costal and inner margins curved at least as decidedly as in *perconflua*. In maculation it does not differ from *rubifera*, except in the lack of a median shade in the specimens before me. But this may not be permanent, and I attribute most value to the wing form and the totally different genitalia of the male. It was this form that I dissected to illustrate *rubifera* in pl. IV, f. 37 of Bulletin 44, already cited, and a new figure is given on pl. VII, fig. 3, herewith. The differences between the two are simply in details and partly due to a difference in mounts. My examples are from the vicinity of Albany, N. Y.

It is not impossible that one or the other of these forms may really be the same as the European *rubi*, or the latter may even agree with one of the western forms. Unfortunately I have none for comparison.

Noctua jucunda *Wik.* = *perconflua* *GRT.*

This species has approximately the wing-form described for *cynica*, but is more brightly marked. All the specimens I have seen are distinctly mottled or shaded with yellow and the transverse lines are more irregular. The reniform is more regularly kidney-shaped and both spots are mottled, the orbicular quite usually open above.

The male was not before me in 1890, and a figure of the genitalia is presented herewith on pl. VII, fig. 4. It will be seen at once that it is of the same type as in *cynica* while yet very different in detail, and it shows that the new species follows its ally in wing form rather than that most like it in ornamentation.

Noctua calgary, sp. nov.

At various times Mr. F. H. Wolley Dod has been sending me examples which I have not been satisfied to place with either *rubifera* or *rosaria*, but named *rosaria*, I think. The recent receipt of specimens bringing the number up to three males and one female—a much better series was unfortunately ruined in sending—makes it possible for me to decide that we have a new species to deal with. Superficially it is distinct by the more trigonate primaries, which have rectangular apices, the outer margin straight to vein 3, then forming an obvious though obtuse angle inwardly. In all the specimens the ordinary spots are gray powdered and the median shade is obvious. The s. t. space is the darkest part of the wing in all examples and contrasts with the pale ter-

minal space. This is exactly opposite to what is usually found in *rubifera* and *rosaria*, and by this and the wing form the species may be recognized, I think.

The sexual characters of the male are quite different from those of the other allied species and are figured on plate VII, fig. 5. The derivation is evidently from the *rubifera* type, but is modified in both harpe and clasper at least as much as is indicated by the difference in wing form.

The examples before me vary in the amount of contrast in the ornamentation. In one specimen the space between the ordinary spots is black filled; in another it is still a little darker than the ground color; the others are intermediate. The female has the outer half of the median space darker than the basal portion of the wing; but this is probably not a sexual characteristic.

The dates given are in June and July and one specimen is marked bred from larva beaten from willows at night. Mr. Dod writes that he bred two examples and that the species is not uncommon.

Noctua rosaria Grt.

This species I have from British Columbia, Washington and the Sierra Nevada, California. It is like *rubifera* in size and wing form but the ground appears more even, while yet the ordinary spots seem more mottled. The specimens have a somewhat more rusty shading, which yet gives the impression of a velvety surface. It is almost impossible to put the difference into words; yet it exists and is visible on comparison, while its importance is demonstrated by the genital characters which are shown at plate VII, figs. 6 and 7. The differences between the two figures is that between a flat mount (fig. 6) and one in a cell (fig. 7); the latter showing the natural curves and position of parts.

Noctua esurialis Grt.

I have specimens from Corfield, Vancouver and from Portland, Oregon, which I take to be this species. The specimens from Vancouver agree perfectly with Mr. Grote's description and with my notes on the type when I referred it as a probable geographic race of *jucunda*. The latter it is decidedly not, but I am not certain that it is not a form of *rosaria*. Compared with the latter it seems somewhat broader winged and dirtier; darker and more sordid in color. Yet the differences are scarcely tangible and as my material is almost all from electric light globes it leaves something to be desired.

The genital structure of the male indicates a good species, but leaves

some doubt. The differences will be found in comparing fig. 8, in plate VII, with those cited for *rosaria*. The chief point is in the much narrower harpes and this amount of variation I have not seen equalled elsewhere in the same species. Three males, one from Corfield and two from Oregon are practically identical, while three specimens of *rosaria* from the three localities represented are also practically the same.

This study of the forms allied to *rubifera* will serve to indicate that our knowledge of the species is by no means even yet complete and that much remains to be done. The material in collections even of the Eastern forms is altogether insufficient in amount and character to fairly illustrate the species. All the examples of the forms referred to here should be preserved for careful study.

Noctua inopinatus, sp. nov.

Among the material received from Mr. A. W. Hanham, Winnipeg, Manitoba, are specimens that I have named *haruspica* with some doubt. Other examples from Corfield, Vancouver and 264 (Gillette) Colorado, have increased that doubt and I venture the above name to indicate a form intermediate between the eastern *haruspica* and the western *sierræ*. In size the new species averages less than *haruspica* and the color is as a whole more evenly smoky and with less red. The ordinary spots are somewhat better relieved, while the median lines tend to become broken and incomplete, while yet the detached parts may be well marked.

In all other respects, including sexual structure of the male, the agreement is with *haruspica* and the species may be deemed an impressionist one, rather than one based on sharply definable characters. Plate VII, fig. 1, illustrates the sexual pieces, the figure given in my Revision having been made, as now appears, from an imperfect specimen.

Noctua treatii Grt.

Since I wrote in 1890 this species has turned up in several places and is now well represented in a number of collections. To the locality given in my catalogue must be added Jefferson, N. H.; Adirondack Mountains, N. Y.; Central Maine and Calgary, Canada. None of the examples seen approaches in size the specimen referred to in my Revision and now in the U. S. National Museum.

Noctua exuberans, sp. nov.

Ground color gray, varying from reddish to almost ashen, more or less irrorated. Head without markings; palpi deep brown at the sides. Collar with the lower half deep sienna brown. Thorax otherwise without markings. Primaries with the median lines obsolete, except on costa where the basal, t. a. and t. p. lines are indicated by black spots. A median shade is indicated by a brownish cloud. In one

specimen it is possible to trace a vague t. a. line part way across the wing. The s. t. line is indicated but is broken, a little paler, principally marked by the slightly darker terminal space and toward the costa also by a dusky preceding cloud. The orbicular is wanting in the specimens before me. The reniform is small, kidney shaped, black; but with indefinite outlines and incomplete superiorly. Secondaries whitish, iridescent, becoming smoky at the margin, where there is a brown terminal line setting off the white fringes. Beneath whitish, a little powdered at the margins, the primaries a little darker than the secondaries, and in one specimen almost smoky. Expanse, 1.60 inches = 40 mm.

Habitat: Glenwood Springs, Colorado, in July; Dr. Barnes.

Three male specimens are before me, each differing a little in color; but otherwise very similar. The species is allied to *lubricans*; but is larger and with much less trace of the ordinary markings, while on the other hand the reniform is much more distinct. In most of the examples of *lubricans* the transverse lines may be made out. In this species there is no appearance of them except on the costa. Two of the specimens are uniform in color, although different in shade. The third specimen is ashen gray along the costa and in the terminal space, while the rest of the wing has a reddish cast. The species reminds one somewhat of *incivis*, but the wing form is different.

In sexual characters the insect agrees in general with the group in which I have placed it, and is one of those showing no very characteristic features. It is represented in Plate VII, fig. 10.

Noctua bolteri, sp. nov.

Ground color red with a violet tinge. The markings rusty brown and black. The vestiture of the head and thorax is defective, hence it is impossible to say whether or not they are maculate. Basal line geminate, black, emphasized by brown scales, continuing to the submedian vein and from that point obliquely outward to the inner margin. At this point there is an oblique brown shade which marks the middle of the lower half of the median space. In the cell there is, almost midway between the basal and t. a. line, an upright black mark which is inwardly margined by yellowish scales. T. a. line geminate, the outer part black, the inner brown; included space marked with yellow scales. As a whole the line is nearly upright to the submedian vein and then with a strong outcurve to the inner margin. T. p. line geminate, lunulate, with a square outward bend over the cell, then incurved below; made up of black lunules followed by yellow scales and outwardly margined by a rusty brown, rather broad and nearly even line. S. t. line yellow, irregular, forming a W on veins 3 and 4, preceded by a distinct brown shade which becomes blackish toward the costa. A series of black terminal lunules, which are outwardly marked with yellow. There is a brown, irregular median shade. Claviform large, filling nearly the entire space between the median and submedian veins; outlined by black scales within which is a yellow line, and the whole is filled with brown. Orbicular large, oval, incomplete above, outlined by black scales within which is a yellow annulus. Reniform very large, broad, hardly kidney shaped, outlined with black scales, then annulate with yellow; the center with a whitish lunule. Secondaries smoky gray, the

fringes almost white, a vague trace of a discal lunule showing from below. Beneath primaries pale, powdered along the margin with carmine scales, and with a vague discal spot. Secondaries with a more distinct discal spot and incomplete outer line. Expanse, 1.32 inches = 33 mm.

Habitat: Las Vegas, New Mexico, July 11th.

A single female specimen was received from Mr. A. Bolter, after whom I have named this most remarkable insect. It is totally unlike any other of the described species in every respect and at first sight recalls some of the *Plusiid* forms allied to *Diastema*; yet it has all the characters of the genus *Noctua* to which I refer it, and in this genus it stands by itself. Its occurrence in New Mexico contradicts the general distribution of the genus which I have elsewhere referred to, and the male may present characters which will induce the reference of the species to some other genus.

Noctua plebeia, sp. nov.

Ground color a dirty clay yellow, with blackish powderings which give it a sordid appearance. Head and thorax without obvious markings. The tip of the collar paler, the general shading of the thorax a little darker than the primaries. There is an obvious divided anterior and posterior tuft. All the markings are traceable, though all are more or less incomplete. Basal line geminate, black, extending to the submedian vein. T. a. line geminate, black, incomplete both parts of the line almost equally distinct; as a whole with a very slight outcurve. T. p. line blackish, powdery, geminate, very even, feebly bisinuate. S. t. line consisting of a series of very black spots which may become partly united into a broken line, and outwardly margined by a few yellowish scales. There is a series of brown or blackish terminal lunules, beyond which is a yellowish line at the base of the fringes. There is a diffuse median shade which is hardly marked on the costa; but is obvious below the median vein. The claviform is outlined by brown and black scales and filled with brown. Orbicular moderate in size, oval, rather irregular, outlined by pale scales, black filled. Reniform large, kidney shaped, outlined by yellowish and brown scales, and filled with black. The space between the ordinary spots is brown. Secondaries smoky fuscous, the fringes considerably paler. Beneath, smoky, powdery, the primaries darker; the secondaries with a very distinct large discal spot and a broad median line. On the primaries similar marks are traceable. Expanse, 1.40 to 1.60 inches = 35 to 40 mm.

Habitat: Vancouver, August 14th; Livingston. British Columbia; California.

I have two males and one female, and have seen other specimens; one at least from Oregon, and I think also a specimen or two from Washington. The California specimen is the only female and is, I believe, from some point in the Sierra Nevada Mountains. This species is very well marked and is unlike any others of those that are described. In a general way it is allied to *baja*, or, as it must now be known, *smithii*,

but the most obvious difference and the one that will enable this species to be readily recognized is in the black filled ordinary spots. In this character the species is unique. The insect gives the impression, somehow, of a dirty creature.

The male parts are very simple, consisting of a single upright corneous process on a broad triangular harpe.

Setagrotis elata, sp. nov.

Ground color ash gray, varying in general shade from a yellowish to a bluish tinge. Head and thorax without markings of any kind. Primaries with all the markings obscured and very feebly traceable. The median lines are always visible as geminate black costal spots, but beyond that they are only vaguely indicated. In a general way and so far as can be indicated the t. a. line seems to be a little outcurved between the veins, and as a whole a little outcurved in its course. The t. p. line is even, with an even outcurve over the cell and an almost equally even incurve. The s. t. line is whitish, irregular, broken, well defined by a blackish preceding shade and by the somewhat darker terminal space. The claviform is merely indicated by a few black scales. Orbicular round, of moderate size, incompletely defined by a few black scales, within which is a somewhat more distinct circlet of yellowish scales. The reniform is moderate in size, also incompletely outlined by black and yellow scales, the lower portion filled with blackish and forming quite a prominent feature in the markings of the wing. Secondaries in the male white, with a vague smoky outer margin and a narrow discal lunule. In the female more smoky, with a blackish outer margin and discal lunule. Beneath whitish, powdery, with a more or less marked outer line and discal spot on both wings. Expanse, 1.50-1.60 inches = 36-40 mm.

Habitat: Colorado.

I have three specimens, two males and one female, received from Professor C. P. Gillette, and numbered 565, 2610 and 2732. The specimens differ considerably, and yet resemble each other quite closely. The female is the larger and much the darker. All the specimens agree in showing the black filled reniform and pale, dark bordered s. t. line. as the only prominent features in the wing.

EXPLANATION OF PLATE VII.

- Fig. 1. Harpe and clasper of *Noctua inopinatus*, male.
 " 2. " " " *Noctua rubifera*, male.
 " 3. " " " *Noctua cynica*, male.
 " 4. " " " *Noctua jucunda*, male.
 " 5. " " " *Noctua calgary*, male.
 " 6. " " " *Noctua rosaria*, male.
 " 7. " " " *Noctua rosaria*, male.
 " 8. " " " *Noctua esurialis*, male.
 " 9. " " " *Noctua hospitalis*, male.
 " 10. " " " *Noctua exuberans*, male.

All the figures are drawn with a camera lucida and to the same scale.